



Grower Summary

PO/BOF 002b

The National Cut flower Trials
Centre Programme for 2018-2022

Annual Report

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The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Lyndon Mason

Project Manager and Director

Cur Flower Centre Ltd

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GROWER SUMMARY

Headlines

- New varieties of *Astrantia major* have shown potential to be developed as a new UK cut flower crop, which is currently in demand by the market.
- Varieties of both *Gomphrena* and *Lepidium* have shown potential for production as seed-raised fillers which can be once-over harvested.
- Removing the central flower bud from *Lysimachia* and *Veronica* produced a taller, heavier and more floriferous premium end product.
- New Japanese-bred varieties of column stocks (*Matthiola*) have shown potential to extend the current production period, if seedling selection issues can be addressed.
- There are large differences in the varietal susceptibility of column stocks (*Matthiola incana*) to infection by *Fusarium oxysporum* even within specific series e.g. 'Centum' and 'Mathilda'.
- Phytotoxicity trials have indicated that Frupica SC (mepanipyrim) is a safe product to use on a wide range of cut flowers, when used at the rate stated in the EAMU.

Background

The National Cut Flower Trials Centre (CFC) was proposed by industry representatives and subsequently funded by the HDC (now AHDB Horticulture)¹, starting in 2007. Its short-term aim was to provide new product development information by investigating novel or alternative cut flowers for production outdoors or in polythene tunnels to stimulate UK production.

2018 was the first year of a new funded project and after taking guidance from industry, a new five year programme of work (2018 to 2022) was agreed to broaden the remit of the CFC, addressing a wider range of issues beyond new product development (NPD). Topics addressed in the first two years included: trials examining *Fusarium* control in column stocks

¹ Initially with part-funding from the Lincolnshire Fenlands LEADER+ programme

production, in conjunction with Warwick University; evaluation of new herbicide products for field-grown crops and reactive trials addressing current, important industry issues. During 2018, the CFC was able to quickly investigate a widespread occurrence of downy mildew in column stocks, commission sensitivity testing by Fera and recommend a revised spray programme to improve disease control on some nurseries. In 2019, the CFC also contributed to the setting up of an industry-led tulip promotional campaign - #loveBritishtulips. This campaign will launch in early 2020.

Summary

New product development

Asclepias (varieties of *Asclepias curassavica* and others)

Relatively unknown in the UK, when tunnel grown the most promising variety in trial during 2018 was *Asclepias curassavica* 'Apollo Orange', which produced prolific and attractive, orange-red inflorescences on long stems over a period of about four weeks. *Asclepias incarnata* 'Carmine Rose' and 'White' produced aborted or desiccated blooms. *Asclepias tuberosa* produced very attractive blooms but the stem length was too short at around 30cm. All of the 2018 plantings overwintered successfully into 2019 except 'Apollo Orange' which necessitated a fresh planting. The overwintered varieties performed very differently in 2019, with the *A. incarnata* 'Carmine Rose' and 'White' producing a marketable flush of good quality, long (in excess of 80 cm) flower stems in week 27 with a vase life (VL) of between nine and ten days. *A. tuberosa* produced very attractive blooms with a stem length of around 45 to 50cm (also in week 27) which would have made them potentially marketable. The new 2019, week 23, planting of *A. tuberosa* 'Apollo Orange' produced a flush of long attractive flower stems in week 36 but these only achieved a VL of one day owing to the foliage immediately wilting.

From the last two years trials, *Asclepias* does seem to have potential as a UK-grown cut flower, but because of the VL, stem length and bud abortion issues experienced at certain times throughout the trial, it is not likely to be reliable enough to be used as a supermarket product without further work.

***Astrantia* (varieties of *Astrantia major*)**

Astrantia was planted at the CFC for the first time in 2018 to trial a new range of varieties including 'Sparkling Stars Pink' and 'Sparkling Stars Red'. These were overwintered into 2019 and produced a flush of good quality marketable stems from week 24 to week 35. Stem length was consistently in excess of 65cm with a VL of between ten and 12 days. Overall the plants were trouble-free, with two spotted spider mite being the only P&D issue evident in 2019. *Astrantia* is a product generating a lot of interest amongst the industry and is in demand by both the packers and end consumers. Growers would need to investigate the economics of production, but *Astrantia* does seem to have the potential to be developed as both a protected and outdoor new UK produced cut flower crop.

***Didiscus* (varieties of *Didiscus caeruleus*)**

Plants were sown into modules in week 15 and transplanted in week 23, with the first marketable stems being produced in week 32, continuing through to week 34. *Didiscus* was included in the 2019 trials because it belongs to the Umbelliferae family, the same family as Ammi, Anethum and Daucus, all of which have proven successful in previous CFC trials. While the trial did generate a marketable crop, it was not easy to propagate or harvest, resulting in both uneven growth and untidy flower stems, making *Didiscus* more of a florist product, as it would be difficult to cost effectively grade the flower stems to a consistent level required by supermarkets (very similar to the issues experienced with *Cosmos* in previous CFC trials).

***Echinacea* (varieties of *Echinacea purpurea* and others)**

A large variety trial of *Echinacea* is currently underway at RHS Wisley (2016 to 2020) and when viewed by the Project Manager in 2018 it was evident that a number of the varieties

had potential as cut flowers. In order to assess this potential, a number of varieties were planted in late 2018 which then flowered in 2019. Most of the varieties overwintered successfully except for 'Green Jewel' which suffered 50% losses. Overall the trial generated marketable flowers from week 28 onwards, but the stage of harvest was difficult to determine and requires further work. The crop will therefore be overwintered for one further year of trialling, focusing on determining the ideal harvesting stage of the flowers and subsequent VL performance.

Eryngium (varieties of *Eryngium alpinum*, *planum* and *yuccifolium*)

A range of different Eryngium varieties were planted in 2019 and these will be overwintered to assess their true potential as cut flowers the following year (2020). Eryngium is widely used in mixed bouquets sold in the UK, but most (if not all) of the stems are imported, indicating that there is potential for import substitution. Product from the trial will be used to provide samples for UK packers as well as to assess VL performance.

Gomphrena (varieties of *Gomphrena haageana*)

Gomphrena has been investigated by the CFC in previous years, and of the species trialled, *G. haageana*, was the only one that produced stems that were long enough to be suitable for use as a 'filler' in mixed bouquets. The product was not taken up by the industry, but recent interest in UK produced 'fillers' resulted in a request to revisit Gomphrena trials. A single planting was therefore made in week 23 which flowered from week 34 onwards. Overall the trial generated a crop that was very prolific, with a good stem length and acceptable VL, receiving positive feedback from the industry. However, the speed and cost of harvesting is a potential issue, but the crop could lend itself to multiple sowing dates with the possibility of once-over harvesting. This will be investigated in 2020.

Lepidium 'Green Dragon'

While relatively unknown to UK growers, Lepidium is currently imported from The Netherlands indicating that there is a market for home produced product. Two plantings were made of 'Green Dragon', a recently released new variety. All plug formats used in the trial, including

the small plugs supplied directly by the breeder, established well and grew away vigorously. The time from planting to cropping was 7 to 8 weeks and the flower stem length was consistently between 60 and 70cm. The 2019 trial has demonstrated that *Lepidium* is relatively easy to produce, but because of the dense and tangled nature of the mature crop it needs to be once-over harvested and then graded on a packing line. Currently the main interest in this crop is from florist outlets, but it does have the potential for use as a filler in supermarket mixed bouquets.

Lysimachia (varieties of *Lysimachia fortunei*)

During 2018, two varieties of *Lysimachia*, 'Jumbo' and 'Mambo' were planted in week 21 at a density of 25/m². The crop was cut down in week 41 of 2018 and overwintered into 2019. The crop died back completely over the winter and new shoots began to appear in week 14, with the first flower stems being ready to harvest in week 26, most achieving or exceeding 60cm in length. The trial continued to flower for a further seven weeks and this was extended to week 35 by the removal of the centre bud from a few late flower stems. The centre bud can be removed at a very advanced stage of development and this allows the side shoots to develop. The resulting final flower stem was in excess of 80cm and produced a very bulky product with up to ten buds per stem. Such a large stem is unlikely to be suitable for supermarkets, but could possibly achieve a premium price as a florist product. VL tests undertaken on the standard stems (which had not been disbudded) demonstrated a VL of ten to 11 days. The varieties used in this trial are no longer commercially available, but alternative varieties still available include 'Abraham', 'Elisabeth' and 'Helene'. Specialist growers could consider the production of small areas of *Lysimachia* (including disbudded product) for floral display work.

Scabious (varieties of *Scabiosa atropurpurea*)

Scabious are well-known as a vigorous garden plants with prolific, attractive flowers in a wide range of colours with the perennial forms already grown as outdoor commercial cut flower crops. In recent years, new ranges of *S. atropurpurea* have been introduced to the market,

with the 'Scoop series' generating the most interest from the industry over three years of CFC trials. New and improved varieties continue to be introduced, and the 2019 trials concentrated on a new range called 'Focal Scoop', which claim to have the advantage of longer stems and larger flowers. Some of the best performing varieties from the previous year's trials were also included in 2019. Other propagators of Scabious were invited to provide their varieties for trial, but declined to be involved.

Trials in previous years have indicated that an early planting date produces a more prolific crop because it allows the plant to establish a sturdy frame and good root structure before being put under stress during warmer weather conditions. In order to maximise their potential, plugs were potted into 9cm pots in week 11, pinched four weeks later and the well branched plants transferred to the tunnel in week 20. Not all of the 'Focal series' were available for early planting and some were not delivered until week 23. The plants from 9cm pots established well and produced a very heavy flush throughout the very warm weather in July. At the end of July (week 31) a decision was made to cut down half of each bed to around six inches from the ground in order to rejuvenate the crop and see if the flowering period could be extended. The half of the bed that was not cut down continued to flower until the crop was removed in week 41. The half that was cut down started to flower again in week 36 and produced stronger and more vigorous stems than the plants which weren't cut back. Some commercial glasshouse crops grown in 2019 continued to flower from July to December, giving a six month harvesting period. The week 23 planting of 'Focal Scoop' produced weaker, shorter stems with smaller flowers than the earlier planted crop.

No further trials on Scabious are planned, unless the ongoing breeding work develops new varieties that have attributes that justify planting additional demonstration plots. A technical note summarising the CFC trials to date will be produced during 2020.

Veronica (varieties of *Veronica longifolia*)

In 2018, a new series of Veronica was trialled (the 'Skyler' series), available as blue, white and pink flowered varieties. The trial showed that when tunnel grown, a combination of

different planting and pinching dates could achieve a three month flowering period. It is likely that this period could be extended further if the crop was grown in a glasshouse.

The 2018 planting was overwintered to assess the second year performance, along with disbudding trials aimed at producing a heavier and more floriferous stem. In order to facilitate more air movement around the plant and hence reduce disease pressure, the density was reduced from 25/m² to 12/m² by removing every other plant.

The first flush of flowers was ready to harvest from week 24 and produced good quality long and strong flowers stems in excess of 80cm. However, a number of the flowers showed a level of distortion, resembling fasciation, which would have resulted in over 50% of the crop being unmarketable. The cause of this abnormal growth was not clear, but the problem was evident on a wide range of garden grown Veronica during 2019. The second flush of flower was produced from week 35 onwards and showed no signs of the fasciation that was evident in the first flush. Following a suggestion of a packer member of the Management Group, a number of stems had the centre bud removed and this resulted in the production of a longer, stronger flower stem with between four and six blooms per stem. This produced a better quality product compared to the non-disbudded product, making them more suitable for use in mixed bouquets. The technique will be investigated further after the crop is overwintered for a final year into 2020. The initial tests produced on the disbudded stems demonstrated a VL of between 11 and 12 days.

Other trials

Column stock (Matthiola) – Fusarium susceptibility variety trial

Fusarium oxysporum is an important pathogen associated with column stocks production, and growers regularly observe differences in susceptibility to this pathogen within the current commercial range of varieties. An attempt was made to quantify these differences in an extensive replicated trial undertaken on a grower's business in 2012, but since then there have been significant changes to the range of varieties that are grown. In order to examine these new varieties, along with a desire to determine the Fusarium susceptibility of the new

range of Japanese-bred varieties, a large replicated trial was planted in the Haygrove tunnel at the CFC that had been inoculated with *Fusarium* two years earlier. The 2019 trial clearly demonstrated that there are large differences in the susceptibility of column stock varieties to *Fusarium oxysporum*. Some of the older varieties are already known to be very susceptible (e.g. 'Centum Red', 'Debora' and 'Fedora Deep Rose') and this was confirmed in the 2019 trial. The 'Mathilda series' and the new Japanese-bred varieties, which were not included in the 2012 trial, expressed large differences in susceptibility between flower colours. Examples of this would be 'Iron Marine' that produced only two marketable flower stems/m², whereas 'Iron Cherry Blossom' produced 46 marketable flower stems/m². Such differences were also evident in the 'Mathilda series' with 'Mathilda Pink' only producing two marketable stems/m², whereas 'Mathilda Yellow' produced 45 marketable flower stems/m².

The results from this trial can be used by growers to enable them to choose less susceptible varieties to plant in situations where the crop will be under more disease pressure, or in the case of later plantings, where the crop will experience higher temperature and stress levels during the production period.

Column stocks (Matthiola) - Fusarium T34 trial

A recent AHDB funded trial investigating *Fusarium* on lettuce has indicated that T34 Biocontrol (*Trichoderma asperellum* – strain T34, a biopesticide for the control of *Fusarium*) applied to the peat blocks at seeding gave a degree of control of the disease. In order to assess the potential of T34 to control *Fusarium* in column stocks, the CFC replicated this technique by direct seeding stocks into peat blocks. T34 was applied once to the blocks at seeding, immediately after planting into the *Fusarium* infected soil in the Haygrove tunnel and then again 10 days later at rate of 1g/10L of water per m².

The results of the 2019 trial were not conclusive, but were positive enough to justify additional trials in 2020. These trials will investigate the effect of a commercial propagator drenching the plugs with T34 at the seeding stage.

Column stocks (Matthiola) – late planted variety trial

There has been interest in the Japanese-bred varieties of column stocks for some time but there has been very little commercial uptake owing to the inability of not being able to automate the selection of double flowered seedlings, as is the case with the current widely grown commercial varieties. The hand selection process required, and the higher than normal percentage of singles which pass through it, make these an expensive bloom to produce and there has to therefore be a commercial advantage in their production. The main potential advantage could be the ability to extend the season of the column stocks crop into the summer months, because it has previously been reported, and clearly demonstrated in the 2018 trial, that the Japanese-bred varieties are less prone to flower initiation problems during periods of higher temperatures.

In 2019, four plantings in weeks 18, 20, 22 and 24 demonstrated that the Japanese-bred varieties could produce reliably long flower stems, with all varieties exceeding 55cm and many in excess of 60cm. However, discussions with growers have highlighted that unless a reliable market outlet can be found for the single flowered stems, allowing the crop to be grown unselected, the cost of hand selection would currently mean that the production of Japanese-bred varieties would not be economically viable. It should be noted that a major Dutch plant propagator is currently investigating the possibility of automating the selection of these varieties, and the CFC will undertake appropriate additional trials if this proves to be a successful technique.

Lily - alternatives to peat-based growing media

Lily bulbs are generally grown in crates of growing medium in order to avoid any soil-borne pathogens. For many years peat was used as the standard growing medium, either alone or mixed with other materials; more recently businesses producing significant quantities of this crop have developed their own bespoke peat-based media (referred to as 'grower's peat-based medium'). Due to environmental concerns over the possible loss of lowland peat bog habitats, there has been a continued search – going back at least to the 1980s - for alternative

materials to use as growing media, or at least to use as diluents in peat-based media. In recent years there has been renewed interest from growers and their customers to adopt more responsibly sourced peat-alternatives in the production of cut flower lilies, and this has been an objective of CFC trials which have been co-funded by Bulrush Horticulture Ltd. With the increasing availability of green-waste and anaerobic digestate these materials have been of particular interest; other more familiar alternative materials were wood-derived or based on coir. The use of peat-free and peat-reduced mixes was further investigated during 2019 in the production of lily 'Dynamite' (Oriental group), along with a grower's peat-based medium and a 100% peat medium for comparison.

The peat-reduced mix produced stems with an average length of 82cm and weight of 131g, the peat-free mix produced stems with an average length of 81cm and weight of 128g, the grower's peat-based mix produced stems with an average length of 80cm and weight of 130g and the 100% peat mix produced stems with average length of 82cm and weight of 143g. There was no statistically significant difference between any of the treatments.

Phytotoxicity testing of recently approved pesticides

Through a process of trials and where appropriate, applications for EAMU's, the AHDB Sceptre and SceptrePlus projects have provided a range of additional pesticide options to growers. However, these products are used at grower's own risk, with limited knowledge of potential phytotoxicity issues. In order to try and address this, the CFC has developed a new trial to investigate the potential phytotoxicity of pesticides recently approved through the AHDB Sceptre/SceptrePlus projects that are applicable for cut flower use. In 2019, an EAMU (1107/19) was obtained for the fungicide Frupica SC (mepanipyrim) for the control of powdery mildew on ornamentals. A number of cut flower crops are susceptible to powdery mildew including Delphinium, Phlox, Solidago and Veronica. Varieties from these were planted in two blocks with one block receiving a spray programme comprising of Amistar (azoxystrobin), Frupica SC (mepanipyrim), Nimrod (bupimate) and Takumi SC (cyflufenamid) and the other block receiving the same programme without Frupica SC. Frupica SC was applied at

90ml/100L of water at a volume rate of 1,000L/ha.

The powdery mildew spray programme was maintained up until harvest and no phytotoxicity was observed at any stage of production on any of the plants. This would indicate that Frupica SC is a safe product to use on cut flowers when used at the rate stated on the EAMU, but owing to the wide range of species grown and the various growing conditions provided, growers should always test Frupica SC on a small number of plants before applying it on a wider scale.

Financial benefits

This is the second year of a new five year project and as such any financial benefits reported will not take into account the potential £2.5 million of new product trialled and facilitated by previous CFC trials.

The main financial benefit to the industry in 2019 has been from the 2018 work on downy mildew on column stocks. While reported last year, the adoption of the control measures and spray programme amendments from the 2018 trials resulted in no known major outbreaks of downy mildew on column stocks during the 2019 production year.

While the new products trialled in 2018 and 2019 have yet to be produced on a large scale for supply to the supermarkets, some species such as Scabious and Veronica have been planted by small to medium sized nurseries. An estimate of the total area of these new products in 2019 is 1 ha, and if Scabious is used as an example, with a yield of around 30 stems/m² at a return of 25p per stem this is an additional farm gate value of £75,000.

Action points

- Production of Aстранtia, Didiscus, Lepidum, Scabious and Veronica could be suitable novel, niche ventures for UK cut flower growers.
- As an alternative to production of box-grown lilies in a peat-based medium, trials over the past five years have shown that production in peat + anaerobic digestate gives cut flower lilies of equal quality while reducing peat use, but care should be exercised

when using anaerobic digestate until a standard specification is available. Peat + wood fibre or peat + cocopeat mixtures are also effective. Lily growers should follow the developments regarding the use of peat-free and peat-reduced growing media and amend growing media blends used accordingly.

- Column stock growers should continue to be vigilant to the ongoing threat of the new strain of downy mildew identified in 2018, and implement the recommendations contained in AHDB/CFC Information Sheet 11 '*Maintaining successful control of downy mildew in protected crops of cut flower column stocks*'.
- Column stock growers should use the results of the 2019 Fusarium varietal susceptibility trial to help with the selection of suitable varieties for production in high Fusarium risk situations, such as a second crop in soil with a known history of the disease.
- Growers should consider incorporating Frupica SC (mepanipyrim) into cut flower powdery mildew spray programmes, following any guidance in the EAMU and on the product label.